

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:
BILL L. DAVIS and JESSE S. WILLIAMSON

For Reissue of U. S. Patent 5,630,363
Issued May 20, 1997
Serial No. 08/515,097

Filing Date: May 20, 1999

§ Group Art Unit: 2854

§ Examiner: S. Funk
J. Hilten

Serial No.: 09/315,796

For: **COMBINED LITHOGRAPHIC/
FLEXOGRAPHIC PRINTING
APPARATUS AND PROCESS**

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THIRD SUPPLEMENTAL JOINT REISSUE DECLARATION

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Petitioners, (1) Bill L. Davis, residing at 1126 Tipton Road, Irving, Texas 75060; and (2) Jesse S. Williamson, residing at 5738 Caruth, Dallas, Texas 75209, and being both United States citizens, declare that:

1. We verily believe ourselves to be the original, first and joint inventors of the invention described and claimed, and of the discovery described, in U.S. Patent 5,630,363 and in the specification thereof, and for which invention and discovery we solicit a reissue patent. We affirm the statements made in our original Reissue Declaration filed May 20, 1999, for which we have further amended the specification and claims.

2. Petitioners verily believe that, because of what might be deemed errors in the specification and claims of U.S. Patent 5,630,363, that said '363 patent might be inoperative or invalid (a) by reason of Petitioners claiming in some instances more, and in some instances less, than they had a right to claim in the '363 patent, or (b) for the reason that the '363 claims might be interpreted as failing to particularly point out and distinctly claim the subject matter which

the undersigned Petitioners regard as their invention. There also exists certain errors in the specification including, but not limited to, minor stenographical errors. Petitioners declare that all of these errors sought to be corrected arose through their unfamiliarity with U. S. patent practice, and/or through inadvertence, and were all without any deceptive intention. Specifically Petitioners declare that all errors being corrected in this reissue application up to the filing of this oath and their original oath, and the amendment submitted herewith on March 9, 2000, respectively, all arose without any deceptive intent. Petitioners seek to correct these errors through amendments to their specification and claims, and endorse the amendments set forth in Exhibit "A" hereto.

3. Petitioners are informed that under 37 C.F.R. § 1.56(a) that a duty of candor and good faith toward the United States Patent and Trademark Office ("Office") rests on the inventors, on each attorney or agent who prepares or prosecutes the application and on every other individual who is substantively involved in the preparation of prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application. Reissue petitioners are now further aware that all such individuals have a duty to disclose to the Office information that each is aware of which is material to the examination of the application and that such information is material where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent. Reissue petitioners further understand that the duty is commensurate with a degree of involvement in the preparation or prosecution of the application. Reissue petitioners are now informed that the duty of disclosure may extend to their own activities prior to the filing date of the application leading to the '363 patent.

4. Petitioners further declare that their '363 patent specification teaches a combined lithographic/flexographic process having a plurality of successive printing stations for depositing a series of thin, controlled layers of ink or coatings, including, but not limited to, printing color images, on one or both sides of a substrate in a continuous in-line process. In one embodiment of the method of their invention, one of the stations prints a first color image using the flexographic process, and at least one of the successive printing stations prints a second color image "over" the first color image using an offset lithographic process in a "continuous in-line process." Consistent with the teachings in their specification at col. 2, lines 49-58, reissue

applicants teach specifically that in offset lithography, "many sheet fed presses can perfect (print both sides of the paper) in one pass through the press."

5. Petitioners have noticed several potential errors are found in the '363 patent. First, Petitioners declare that in one embodiment of their invention, the reverse side of the substrate may be printed subsequently by lithography and, as desired, subsequently coated. Petitioners believed as of both the filing of their application and the issuance of the '363 patent that the independent and dependent claims clearly covered such an embodiment. Petitioners believed that to one of ordinary skill in the printing art, the language of printing "over" the substrate (see col. 4, lines 29 and 43), as well as other uses in the specification of the term "over" (e.g., col. 4, line 38 and col. 6, line 3), the reference at col. 2, lines 49-58 that in offset lithography "many sheet fed presses can perfect (print both sides of the paper) in one pass through the press", and the many references throughout the specification to a "continuous in-line printing process" and the like, severally and collectively clearly taught one of ordinary skill in the printing art that the reverse side of the substrate may also be printed and, as desired, coated in the continuous in-line lithographic/flexographic process described in the '363 patent. Petitioners did not appreciate, both as of the time of the filing of this application and at the time the '363 claims as issued were presented and allowed, that their method and apparatus having the term "over" might be interpreted (actually misinterpreted) so as not to include the alternative of the reverse side of the substrate being printed by offset lithography and, as desired, coated. If such misinterpretation is made, then reissue applicants have inadvertently, and without deceptive intent, claimed less than they had a right to claim. Such error, if it occurred, was inadvertent and without deceptive intent. Petitioners did not contemplate that absent dependent claims, such as claims 42-43 newly presented, or claims such as the new claims in the alternative tracking specifically the language of col. 2, lines 54-55 with the limitation of printing on the reverse side of the substrate, such a misunderstanding could occur. Accordingly, Petitioners now seek by way of this application for reissue to add claims 42-86, 94-96 and 100-102 to eliminate any ambiguity in the coverage of those claims so that the claims clearly provide that the continuous in-line lithographic/flexographic process of the '363 patent can include perfection, e.g., on a perfector press. Second, Petitioners have found that a specific method(s) and corresponding specific apparatus(i) embodiment, narrower to their claims pending prior to their amendment filed on or about January 26, 2001, and requiring the combination of an anilox roller

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and a high velocity air dryer (e.g., col. 7, lines 5, 29 and 45), was not claimed. Such omission was inadvertent, and occurred without deceptive intent. The combination of employing an anilox roller at a flexographic station and a treatment of a high velocity air dryer at the impression cylinder is specifically taught as a preferred embodiment at col. 7, lines 37-48. Petitioners, accordingly added, in said January 26, 2001 amendment, method and parallel apparatus claims 91-102, some requiring perfection, some not requiring perfection, to cover those narrower method(s) and apparatus(i). Third, Petitioners only in late January added dependent apparatus claims 88-89, believed to be approximately of the same scope as claims 97-99. The deposition testimony of reissue applicants and third party witnesses, including Bird, showed reissue applicants had possession of the inventive concept of performing their method using an auxiliary retractable device coater unit with an anilox roller mounted therein at the time Baker was informed of same on June 12, 1994, and separately and preferably, drying the flexographically printed or coated sheets at the impression cylinder of said flexographic station with a high velocity air dryer. Such omission in the original prosecution to add dependent claims 87-88 to claim 15 was inadvertent, and without deceptive intent. Fourth, reissue applicants desire to eliminate any ambiguity in the scope of coverage of claims directed to their preferred embodiment calling for the use of a dryer used in conjunction with their flexographic step that said dryer need not necessarily be an air dryer, which is a (most) preferred embodiment. Here Claims 103-151 are newly presented in a companion amendment. Fifth, by use of the term "continuous in-line printing process" in their original patent claims, reissue applicants did not intend to exclude any process or apparatus therefor not capable of perfecting, but only capable of printing on one side of the substrate. Claims 103-108, 124, 126, 138-140 are newly presented to eliminate this ambiguity, if it exists. Such errors occurred inadvertently, and without deceptive intent.

6. Sixth, Petitioners further notice the errors in independent method claim 29, containing the term "on top of" in the last step (col. 11, line 54) and in related dependent claim 34, containing the broader term "over" (col. 12, line 6). Hence the dependent claim is broader than the claim it depends on. Such errors render claim 29 partially inoperable, and claim 34 potentially invalid. Such errors were inadvertent, and occurred without deceptive intent, for which reissue applications seek correction.

7. Seventh, Petitioners are concerned that certain of their claims, e.g., claim 1, may be misunderstood as limiting the interpretation of the term "image" to ink, and worse yet, a color ink. Consistent with the specification, e.g., col. 1, lines 18-25; col. 4, lines 12-13; col. 6, lines 46-47, newly presented claims 44-84 require that surfaces at each station be deposited with layers of ink or coating materials so that any ambiguity is avoided.

8. Eighth, stenographic errors occurred in the original patent in the spelling of "Pantone" under "Other Publications" listed as prior art, and of the spelling of "flexographic" at col. 1, line 20. The short-hand abbreviation of "flexographic" as "flexo" at column 3, line 59 should be corrected. Clarification is made of col. 4, lines 46-51 of the specification consistent with the remainder of the specification. All errors occurred inadvertently and without deceptive intent.

9. With respect to each of patent claims 1-41, as further amended, and new claims 42-151, we declare that we believe we are the original first and joint inventors of the subject matter therein claimed and for which a reissue patent is sought on the invention set forth in the attached specification entitled COMBINED LITHOGRAPHIC/FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS, a copy of which amended specification is attached hereto as Exhibit "A"; we hereto state that we have reviewed and understand the contents of this amended specification, including the amended and new claims. As indicated above, we acknowledge our duty to disclose any and all information which is material to examination of this reissue patent application in accordance with 37 C.F.R. §1.56(a). We further declare that we do not know and do not believe that said invention was ever known or ever used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof, or patented or described in any printed publication more than one year before the filing date of the first application leading to the '363 patent; or in public use or on sale in the United States of America more than one year prior to the date of the first application leading to the '363 patent; further, that said invention has not been patented or made the subject to any inventor's certificate issued before the filing date of the first application leading to the '363 patent in any country foreign to the United States of America on any application filed by me or our legal representative or assigns more than twelve (12) months prior to the filing date of said first patent application in the United States of America, and has not been abandoned.

The undersigned Petitioners declare further that all statements made herein of Petitioners' own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application of any reissue patent issuing thereon.

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EXHIBIT A

EXHIBIT A

Reissue of U. S. Patent No. 5,630,363

CLAIMS

Note: Bracketed material in the following claims has been deleted from U. S. Patent 5,630,363 as issued; underlined materials, including new claims 42-102 has been added.

1. Apparatus for a combined lithographic/flexographic printing process comprising:
 - a substrate;
 - a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;
 - one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate with a slurry containing an encapsulated essence using the flexographic process;
 - at least one of said successive printing stations being a lithographic printing station; and
 - an overcoating applied over the liquid vehicle image on the printed substrate at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.
2. Apparatus as in claim 1 wherein said overcoating is an aqueous overcoating.
3. Apparatus as in claim 1 wherein said overcoating is an ultraviolet ink overcoating.

4. Apparatus as in claim 1 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

5. Apparatus as in claim 1 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

6. Apparatus for a combined
lithographic/flexographic printing process comprising:

a plurality of successive printing stations for
printing color images on a substrate in a continuous in-line
process;

one of said stations comprising a flexographic
printing station printing an aqueous-based vehicle image
using the flexographic process to form a metallic coating;

a suspended metallic material being included in said
aqueous-based vehicle image; and

at least one of the successive printing stations
comprising an offset lithographic printing station printing a
color image over the aqueous-based vehicle image using
the offset lithographic process in said continuous in-line
process.

7. Apparatus as in claim 6 wherein said
suspended material includes uniform-sized metal particles
to form said metallic coating.

8. Apparatus as in claim 6 wherein said
suspended material includes nonuniform-sized metal
particles to form said metallic coating.

9. Apparatus as in claim 6 further including:
said flexographic printing station including a plate cylinder
having a flexographic plate thereon, a blanket cylinder, and
an impression cylinder;

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a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

10. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the successive printing stations comprising an offset lithographic printing station for printing a second color image over the first color image using the offset lithographic process in said continuous in-line process.

11. Apparatus as in claim 10 further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

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12. (Amended) Apparatus for creating a combined lithographic/flexographic printing process comprising:
- a substrate;
 - a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;
 - at least two successive ones of said printing stations being flexography stations and comprising:
 - (1) a supply of liquid coating;
 - (2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;
 - (3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;
 - (4) an impression cylinder holding said substrate for receiving said liquid coating image transferred from said blanket cylinder and printing said image on said substrate[,];
 - said at least two flexography stations printing the same liquid coating image in sequence and in superimposed relationship; and
 - at least one offset lithographic printing station [for] receiving said substrate and printing over said liquid coating image.
13. Apparatus as in claim 12 wherein said liquid coating image printed on said substrate is a white color ink.

14. Apparatus as in claim 12 further including an air dryer associated with each of said impression cylinders on said flexography stations, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

15. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

a blanket cylinder at least one of said flexographic printing stations;

flexographic ink-providing means at least one of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image;

a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station in said in-line process for receiving said image printed substrate and printing an additional colored ink image on said substrate on top of said flexographic ink image using offset lithography.

16. Apparatus as in claim 15 further comprising:

a plate cylinder at least one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

17. Apparatus for a combined lithographic/flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for printing color on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image.

18. Apparatus as in claim 17 wherein said additional colored ink images are formed with lithographic inks.

19. (Amended) Apparatus as in claim 17 wherein at least one of the said colored ink images [are] is formed with a waterless [inks] ink.

20. (Amended) Apparatus as in claim 17 further including an air dryer adjacent to said impression cylinder for drying the colored flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

21. Apparatus as in claim 17 further including halftone printing plates for printing said colored ink images.

22. (Amended) Apparatus as in claim 17 wherein said colored flexographic ink image and said lithographic colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

23. Apparatus as in claim 17 wherein said printing apparatus includes a sheet-fed press.

24. Apparatus as in claim 17 wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

25. Apparatus as in claim 17 wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

26. Apparatus as in claim 25 wherein said suspended particles are uniform in size.

27. Apparatus as in claim 25 wherein said suspended particles are nonuniform in size.

28. Apparatus as in claim 25 wherein said suspended particles are metallic particles.

29. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/flexographic printing stations for printing colored ink images on a substrate;

printing a flexographic ink image on said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing colored ink images [on top of] over said flexographic ink image at at least one of said subsequent lithographic printing stations with an offset lithographic process.

30. A method as in claim 29 further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

31. A method as in claim 29 further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

32. A method as in claim 29 wherein said colored inks forming said colored ink images are waterless.

33. A method as in claim 29 wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

34. (Amended) A method as in claim 29 further including the steps of:

printing a slurry on said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an overcoating [over] on top of said slurry at a subsequent printing station in said in-line process to protect said essence.

35. A method as in claim 34 further including the step of printing an aqueous-based coating over said slurry.

36. A method as in claim 34 further including the step of printing an ultraviolet coating over said slurry.

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37. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying a flexographic ink to a blanket cylinder in a pattern with a coating head at a first flexographic printing station;

transferring said pattern of flexographic ink from said blanket cylinder to the substrate; and

printing a waterless ink pattern over said flexographic ink pattern on said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

38. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle image having suspended particles therein on a substrate at a first flexographic printing station;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional colored ink images on said printed substrate over said aqueous-based vehicle image in an offset lithographic process at said at least one additional printing station in said in-line process.

39. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for printing liquid vehicle images on a substrate in said in-line continuous process;

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- (2) utilizing an anilox roller to transfer a liquid ink as said liquid vehicle to a flexographic plate image at at least one of said printing stations;
- (3) printing said liquid ink from said flexographic plate image to a substrate;
- (4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;
- (5) repeating steps (2)-(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on said substrate; and
- (6) printing an ink pattern over said flexographic ink image using an offset lithographic process.

40. A method as in claim 39 further including the step of additionally printing colored ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

41. A method as in claim 40 wherein said liquid ink is an opaque white color.

42. The apparatus of any of claims 1, 6, 10, 12, 15 and 17; wherein the substrate is printed on both sides in one pass during the continuous in-line process.

43. The method of any of claims 29, 37, 38 or 39 wherein the substrate is printed on both sides in one pass during the continuous in-line process.

44. Apparatus for a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for depositing a series of images on one side of a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate using a flexographic process; and

at least one of said successive printing stations being a lithographic printing station;

whereby said substrate is printed on top of or on the opposite side of that previously printed at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.

45. Apparatus as in claim 44 wherein at least one of said images at the flexographic station is a coating material.

46. Apparatus as in claim 44 wherein at least one of said images at one of the lithographic stations is an ink.

47. Apparatus as in claim 44 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

48. Apparatus as in claim 44 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

49. An apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station printing an aqueous-based vehicle on one side of the substrate using the flexographic process to form a metallic coating image;

a suspended metallic material being included in said aqueous-based vehicle; and

at least one of the successive printing stations comprising an offset lithographic printing station printing a color image on top of the aqueous-based vehicle or on the opposite side to that previously printed using the offset lithographic process in said continuous in-line process.

50. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the other successive printing stations comprising an offset lithographic printing station for printing a second color image on the reverse side of the substrate of the first color image using the offset lithographic process in said continuous in-line process.

51. Apparatus as in claim 49 wherein said suspended material includes nonuniform-sized metal particles to form said metallic coating.

52. Apparatus as in claim 49 further including: said flexographic printing station including a plate cylinder having a flexographic plate thereon, a blanket cylinder, and an impression cylinder;

a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

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53. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the other successive printing stations comprising an offset lithographic printing station for printing a second color image on the reverse side of the substrate of the first color image using the offset lithographic process in said continuous in-line process.

54. Apparatus as in claim 53 further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

55. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process;

at least one of said printing stations being flexographic stations and comprising:

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(1) a supply of liquid coating;

(2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;

(3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;

(4) an impression cylinder for receiving said liquid coating image transferred from said blanket cylinder and printing said image on one side of said substrate; and

at least one offset lithographic printing station for receiving said substrate and printing on top of or on the opposite side to that previously printed.

56. Apparatus as in claim 55 wherein said liquid coating image printed on said substrate is a white color ink.

57. Apparatus as in claim 56 further including an air dryer associated with each impression cylinder on each flexographic station, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

58. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process, said printing stations including both lithographic and at least two flexographic printing stations;

a blanket cylinder at at least a first one of said flexographic printing stations;

flexographic ink-providing means at the other of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image on one side of a substrate;

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a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station
in said in-line process for receiving said image printed
substrate and printing an additional colored ink image on
said substrate on top of said flexographic ink image or the
opposite side to that previously printed using offset
lithography.

59. Apparatus as in claim 58 further comprising:

a plate cylinder at said at least first one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

60. Apparatus for a combined lithographic/flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for depositing a series of images on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations
having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to one side of said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image or on the opposite side to that previously printed.

61. Apparatus as in claim 60 wherein said additional colored ink images are formed with lithographic inks.

62. Apparatus as in claim 60 wherein at least one of said colored ink images is formed with a waterless ink.

63. Apparatus as in claim 60 further including an air dryer adjacent to said impression cylinder for drying the colored flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

64. Apparatus as in claim 60 further including halftone printing plates for printing said colored ink images.

65. Apparatus as in claim 60 wherein said colored flexographic ink image and said lithographic colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

66. Apparatus as in claim 60 wherein said printing apparatus includes a sheet-fed press.

67. Apparatus as in claim 60 wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

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68. Apparatus as in claim 60 wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

69. Apparatus as in claim 68 wherein said suspended particles are uniform in size.

70. Apparatus as in claim 68 wherein said suspended particles are nonuniform in size.

71. Apparatus as in claim 68 wherein said suspended particles are metallic particles.

72. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/flexographic printing stations for depositing a series of images on a substrate;

printing an image as one of said thin controlled layers on one side of said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing an image on the reverse side of said substrate having said flexographic ink image, at at least one of said other subsequent lithographic printing stations with an offset lithographic process in the continuous in-line process.

73. A method as in claim 72 further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

74. A method as in claim 72 further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

75. A method as in claim 72 wherein said colored inks forming said colored ink images are waterless.

76. A method as in claim 72 wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

77. A method as in claim 72 further including the steps of:

printing a slurry on one side of said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an ink on the reverse side of said substrate at a subsequent printing station in said in-line process.

78. A method as in claim 77 further including the step of printing an aqueous-based coating over said slurry.

79. A method as in claim 77 further including the step of printing an ultraviolet coating over said slurry.

80. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying an ink or coating to a blanket cylinder in a pattern with a coating head at a flexographic printing station;

transferring said pattern of ink or coating from said blanket cylinder to one side of the substrate; and

printing a waterless ink pattern on the reverse side of said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

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81. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle having suspended particles therein on one side of a substrate at a flexographic printing station to form an image;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional images on the reverse side of said printed substrate in an offset lithographic process at said at least one additional printing station in said in-line process.

82. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for depositing a series of images on a substrate in said in-line continuous process;

(2) utilizing an anilox roller to transfer a liquid ink as one of said thin controlled layers to a flexographic plate image at at least one of said printing stations;

(3) printing said liquid ink from said flexographic plate image to one side of a substrate;

(4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;

(5) repeating steps (2)-(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on the one side of said substrate; and

(6) printing an ink pattern on the reverse side of said substrate using an offset lithographic process.

83. A method as in claim 82 further including the step of additionally printing ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

84. A method as in claim 83 wherein said liquid ink is an opaque white color.

85. A method of combining offset lithography and flexography using a plurality of successive printing stations in a continuous in-line process, at least one of said stations comprising a flexographic printing station for printing an image on said substrate using a flexographic process:

(1) printing an image at one or more of said printing stations on a substrate using an offset lithographic process;

(2) transferring said image printed substrate to an additional and flexographic printing station and printing at said flexographic and additional printing station a coating on all or part of said image on said substrate;

(3) transferring said substrate to one or more additional printing stations for printing the reverse side of the said substrate; and

(4) printing an image on said reverse side of said substrate at one of such one or more printing stations using an offset lithographic process in the continuous in-line process.

86. Apparatus for a combined offset lithographic and flexographic printing process comprising:

(1) a substrate;

(2) a plurality of successive printing stations for depositing a series of images selected from a group consisting of lithographic and flexographic inks, coatings and slurries on one or both sides of a substrate in a continuous in-line process;

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(3) at least one of said stations comprising a flexographic printing station for printing an image on said substrate using a flexographic process;

(4) at least one of said successive printing stations being an offset lithographic printing station whereby said offset lithographic printing station is used to deposit one of said lithographic materials on either side of the said substrate in the continuous in-line process;

87. Apparatus for a combined offset lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing images on a substrate in a continuous in-line process, said printing stations including both offset lithographic and flexographic printing stations for depositing lithographic inks, and one or more flexographic inks, coatings and slurries on said substrate, whereby said lithographic inks, and one or more flexographic inks, coatings and slurries may be printed successively on one or both sides of said substrate in the continuous in-line process.

88. The apparatus of Claim 15 wherein the flexographic ink-providing means is an anilox roller mounted in an auxiliary retractable coater unit.

89. The apparatus of Claim 15 wherein a high-velocity air dryer is associated with the impression cylinder of said flexographic station.

90. The apparatus of claim 89 wherein the flexographic ink-providing means is an anilox roller mounted in an auxiliary retractable unit.

91. Method of combining offset lithographic and flexographic printing in a continuous in-line sheet-fed process, combining the steps of:

(a) providing a plurality of successive offset lithographic sheet-fed printing stations for printing images on cut paper sheets;

(b) providing one or more flexographic printing stations prior to at least one of said offset lithographic stations for printing a flexographic image on each of said cut paper sheets, each of said flexographic printing stations comprising:

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring a flexographic image to said blanket cylinder;

(2) an anilox roller for applying a flexographic image to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in image-transferring relationship with said blanket cylinder for transferring said flexographic image from said blanket cylinder to said substrate;

at least one of said succeeding printing stations being a lithographic printing station subsequent to said flexographic printing stations, and using offset lithography for printing additional images on top of said flexographic image on each sheet; and

(c) providing a high-velocity air dryer associated with the impression cylinder of each flexographic printing station for drying the flexographic image printed on each sheet.

92. The method of Claim 91 wherein the printing of the flexographic image is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket.

93. The method of Claim 91 wherein the printing of the flexographic image is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

94. Method of combining offset lithographic and flexographic printing in a continuous in-line sheet-fed process, combining the steps of:

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(a) providing a plurality of successive offset lithographic sheet-fed printing stations for printing images on one or both sides of each of a succession of cut paper sheets;

(b) providing one or more flexographic stations prior to at least one of said offset lithographic stations for printing a flexographic image on one side of each of said cut paper sheets, each flexographic printing station comprising:

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring a flexographic image to said blanket cylinder;

(2) an anilox roller for applying a flexographic image to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in image-transferring relationship with said blanket cylinder for transferring said flexographic image from said blanket cylinder to said substrate;

(c) providing at least one succeeding printing station subsequent to said flexographic printing stations, and being a lithographic printing station using offset lithography for printing one or more images on the reverse side of the side on which said flexographic image was printed; and

(d) providing a high velocity air dryer associated with the impression cylinder of each flexographic printing station for drying the flexographic image printed on each sheet.

95. The method of Claim 94 wherein the printing of flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

96. The method of Claim 91 wherein the printing of flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

97. Apparatus for a combined lithographic and flexographic printing process for printing a multicolored image on a succession of sheets comprising:

(a) a plurality of successive printing stations for printing an image on a succession of sheets in a continuous in-line process, said printing stations including both lithographic and one or more flexographic printing station;

(b) each of said flexographic printing stations having:

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring a flexographic image to said blanket cylinder;

(2) an anilox roller for applying a flexographic to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in an image-transfer relationship with said blanket cylinder for transferring said flexographic color image from said blanket cylinder to each of the succession of sheets;

at least one of said succeeding of printing stations being a lithographic printing stations subsequent to said flexographic printing stations, and using offset lithography for printing additional images on top of said flexographic image; and

(c) a high velocity air dryer associated with the impression cylinder of each flexographic printing stations for quickly drying the flexographic image printed on each sheet.

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98. The apparatus of Claim 97 wherein the printing of flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

99. The apparatus of Claim 97 where in the printing of flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

100. Apparatus for a combined lithographic and flexographic printing process for printing multicolored images on a succession of sheets, comprising:

(a) a plurality of successive printing stations for printing images on one or both sides of a succession of sheets in a continuous in-line process said printing stations including both lithographic and one or more flexographic printing stations;

(b) each of said flexographic printing stations having;

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring a flexographic image to said cylinder;

(2) an anilox roller for applying a flexographic image to said flexographic plate on said plate cylinder; and

(3) an impression cylinder in an image transferring relationship with said blanket cylinder for transferring said flexographic image from said blanket cylinder to each of the succession of sheets;

(c) at least one of said succeeding printing stations being an offset lithographic printing station subsequent to said flexographic printing station, and using offset lithographic for printing one or more additional images on the reverse side of the side on which said flexographic image was printed; and

(d) a high velocity air dryer associated with the impression cylinder of each flexographic printing station for drying the flexographic image printed on each sheet.

101. The apparatus of Claim 100 wherein the printing of flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

102. The apparatus of Claim 100 wherein the printing of flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

103. Method of combining offset lithographic and flexographic printing in a single pass printing process, combining the steps of:

(a) providing a plurality of successive offset lithographic printing stations for printing images on a substrate;

(b) providing one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate, each of said flexographic printing stations comprising:

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring the flexographic images to said blanket cylinder;

(2) an anilox roller for applying a flexographic image to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in image-transferring relationship with said blanket cylinder for transferring said flexographic images from said blanket cylinder to said substrate; and

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(c) providing a dryer associated with the
impression cylinder of each flexographic printing station
for drying the flexographic images printed on said
substrate.

104. The method of Claim 103 wherein the
printing process is continuous in-line.

105. The method of Claim 103 wherein the
substrate comprises cut paper sheets.

106. The method of Claim 103 wherein the
substrate comprises a continuous web.

107. The method of Claim 103 wherein the
printing of the flexographic image is accomplished by the
anilox roller being mounted in an auxiliary retractable
coater unit adapted to engage said flexographic plate on
said blanket.

108. The method of Claim 103 wherein the
printing of the flexographic image is accomplished by the
anilox roller being mounted in a dedicated flexographic
printing station.

109. Method of combining offset lithographic and
flexographic printing in a continuous in-line printing
process, combining the steps of:

(a) providing a plurality of successive
offset lithographic sheet-fed printing stations for printing
images on said substrate;

(b) providing one or more flexographic
stations prior to at least one of said offset lithographic
printing stations for printing one or more flexographic
images on said substrate, each flexographic printing station
comprising:

(1) a blanket cylinder, said
blanket cylinder including a flexographic plate having an
image thereon for transferring said flexographic images to
said blanket cylinder;

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(2) an anilox roller for applying said flexographic images to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in image-transferring relationship with said blanket cylinder for transferring said flexographic images from said blanket cylinder to said substrate;

(c) after said flexographic printing stations, one or more succeeding offset lithographic printing stations for printing one or more images on the reverse side of the side on which said flexographic images was printed; and

(d) providing a dryer associated with the impression cylinder of each flexographic printing station for drying the flexographic images printed on said substrate.

110. The method of Claim 108 wherein the substrate comprises cut paper sheets.

111. The method of Claim 103 wherein the substrate comprises a continuous web.

112. The method of Claim 108 wherein the printing of one or more flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

113. The method of Claim 108 wherein the printing of one or more flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

114. Apparatus for a combined offset lithographic and flexographic single pass printing process for printing one or more images on a substrate, comprising:

(a) a plurality of successive offset lithographic printing stations for printing images on a substrate:

(b) one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate, each of said flexographic printing stations having:

(1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring one or more flexographic images to said blanket cylinder;

(2) an anilox roller for applying a flexographic to said flexographic plate on said blanket cylinder; and

(3) an impression cylinder in an image-transfer relationship with said blanket cylinder for transferring said flexographic images from said blanket cylinder to said substrate; and

(c) a dryer associated with the impression cylinder of each flexographic printing stations for quickly drying the flexographic images printed on said substrate.

115. The method of Claim 112 wherein the printing process is continuous in-line.

116. The method of Claim 112 wherein the substrate comprises cut paper sheets.

117. The apparatus of Claim 112 wherein the printing of one or more flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

118. The apparatus of Claim 112 where in the printing of flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

119. Apparatus for a combined lithographic and flexographic continuous in-line printing process for printing one or more images on substrates comprising:

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- (a) a plurality of successive offset lithographic printing stations for printing images on a substrate;
 - (b) one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate, each of said flexographic printing stations having:
 - (1) a blanket cylinder, said blanket cylinder including a flexographic plate having an image thereon for transferring one or more flexographic images to said cylinder;
 - (2) an anilox roller for applying said flexographic images to said flexographic plate on said plate cylinder; and
 - (3) an impression cylinder in an image transferring relationship with said blanket cylinder for transferring said flexographic images from said blanket cylinder to said substrate;
 - (c) at least one of said succeeding printing stations being a lithographic printing station using offset lithographic for printing one or more additional images on the reverse side of the substrate on which said flexographic image was printed; and
 - (d) dryer associated with the impression cylinder of each flexographic printing station for drying the flexographic images printed on each sheet.

120. The apparatus of Claim 117 wherein the printing process is intended for a succession of cut paper sheets.

121. The apparatus of Claim 119 wherein the substrate is a continuous web.

122. The apparatus of Claim 119 wherein the printing of one or more flexographic images is accomplished by the anilox roller being mounted in an auxiliary retractable coater unit adapted to engage said flexographic plate on said blanket cylinder.

123. The apparatus of Claim 119 wherein the printing of one or more flexographic images is accomplished by the anilox roller being mounted in a dedicated flexographic printing station.

124. Method of combining offset lithographic and flexographic printing in a single pass printing process, combining the steps of:

(a) providing a plurality of offset lithographic printing stations for printing one or more images on a substrate;

(b) providing one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate; and

(c) providing a dryer associated with each flexographic printing station for drying said flexographic images printed on said substrate.

125. Method of combining offset lithographic and flexographic printing in a continuous in-line printing process, combining the steps of:

(a) providing a plurality of offset lithographic printing stations for printing one or more images on a substrate;

(b) providing one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate;

(c) after said flexographic printing stations, providing one or more succeeding printing offset lithographic printing stations for printing one or more images on the reverse side of the side on which said flexographic images were printed; and

(d) providing a dryer associated with each flexographic printing station for drying the flexographic images printed on said substrate.

126. The method of Claim 124 wherein the printing process is continuous in-line.

127. The method of Claim 124 or 125 wherein the substrate comprises cut paper sheets.

128. The method of Claim 124 or 125 wherein the substrate comprises a continuous web.

129. The method of Claims 124 or 125 wherein the printing of the flexographic image is accomplished by an anilox roller being mounted in an auxiliary retractable coater unit.

130. The method of Claim 124 or 125 wherein the printing of the flexographic image is accomplished by an anilox roller being mounted in a dedicated flexographic printing station.

131. The method of Claim 124 or 125 wherein the flexographic images are printed using a water based liquid vehicle containing suspended particles.

132. The method of Claim 131 wherein said suspended particles are uniform in size.

133. The method of Claim 131 wherein said suspended particles are nonuniform in size.

134. The method of Claim 131 wherein said suspended particles are metallic particles.

135. The method of Claim 124 or 125 wherein the flexographic images are printed using an opaque color ink.

136. The method of Claim 135 wherein the flexographic images are printed using a white color opaque ink.

137. The method of Claim 135 wherein the flexographic images are printed with a liquid vehicle slurry containing an encapsulated essence.

138. The apparatus for a combined offset lithographic and flexographic single pass printing process for printing one or more images on a substrate, comprising:

(a) a plurality of successive offset lithographic printing stations for printing images on a substrate;

(b) one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate; and

(c) a dryer associated with each flexographic printing station for drying said flexographic images printed on said substrate.

139. Apparatus for a combined offset lithographic and flexographic continuous in-line printing process, comprising:

(a) a plurality of offset lithographic printing stations for printing one or more images on a substrate:

(b) one or more flexographic printing stations prior to at least one of said offset lithographic printing stations for printing one or more flexographic images on said substrate:

(c) one or more succeeding offset lithographic printing stations after said flexographic printing stations for printing one or more images on the reverse side of the side on which said flexographic images were printed; and

(d) a dryer associated with each flexographic printing stations for drying the flexographic images printed on said substrate.

140. The apparatus of Claim 138 wherein the printing process is continuous in-line.

141. The apparatus of Claim 138 or 139 wherein the substrate comprises cut paper sheets.

142. The apparatus of Claim 138 or 139 wherein the substrate is a continuous web.

143. The apparatus of Claims 138 or 139 wherein the printing of the flexographic image is accomplished by an anilox roller being mounted in an auxiliary retractable coater unit.

144. The apparatus of Claim 138 or 139 wherein the printing of the flexographic image is accomplished by an anilox roller being mounted in a dedicated flexographic printing station.

145. The apparatus of Claim 138 or 139 wherein the flexographic images are printed using a water based liquid vehicle containing suspended particles.

146. The apparatus of Claim 145 wherein said suspended particles are uniform in size.

147. The apparatus of Claim 145 wherein said suspended particles are nonuniform in size.

148. The apparatus of Claim 145 wherein said suspended particles are metallic particles.

149. The apparatus of Claim 138 or 139 wherein the flexographic images are printed using an opaque color ink.

150. The apparatus of Claim 149 wherein the flexographic images are printed using a white color opaque ink.

151. The apparatus of Claim 149 wherein the flexographic images are printed with a liquid vehicle slurry containing an encapsulated essence.

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